not find an opportunity of going there. However, M. Barbot de Morny is at the present moment on a visit to those hills. They are supposed to be of the same formation as the country adjacent to a place called, I think, Beresoff, in Siberia, where gold is found; perhaps this is the key to the problem of the Russian annexation of the Amú Darya district, which does not cost them less than 100,000*l.* per annum.

In Khiva, all along the left bank, and between Petro Alexandroskiya and Shah Abbas Wali on the right bank (Russian), there is a good deal of cultivation. Trees are cultivated all along the irrigation canals: willows, aspens, mulberries, planes, black poplars, apple-trees, peaches, &c., fruit of all kinds in great variety, and very good. Crops are maize, wheat, barley, cotton, madder, tobacco, poppy, lucerne, sesamum, &c. Everything is irrigated and raised with great labour. The islands in the river are grazed, the banks and islands are covered with the tall reedy grass (*Lasiagrostis splendens*), tamarisk, dwarf willow (*Elæagnus* * *hortensis*), an acacia, called, I think, *Halimodendron*, and a creeper. The sandy tracts on the right bank have a sparse vegetation of *Lycium*, *Halostachys*, and *Aristida pennata*. I do not think much of any consequence has been done in the botanical way. I found on an island in the central delta a fern which must have had its origin in some distant glen of the north slope of the Hindoo Koosh. M. Smyrnoff, the botanist of Kazan University, found a specimen of Sak Saul further to the south than it was supposed to grow. The flooded parts of the delta and the islands have a dense growth of *Arundo phragmitis* and *Typha;* the Arundo grows to a height of 20 ft. or so, in places.

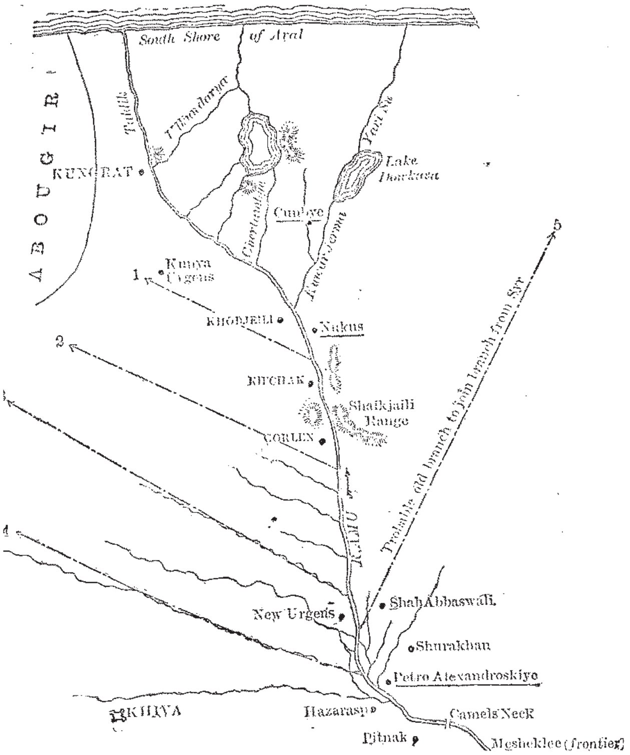

Fig. 6.

By the way, I forgot to mention that in the high ground of the delta I found beds of conglomerate, formed of bivalve shells chiefly with sharks' teeth, cemented together in the vein. Thin beds of sandstone also occur in the masses of sedimentary clay of which these hills and the Bish'yabye ridges are formed. At Bish'yabye I found very large ammonites (18″ diam.) and similar univalves, as well as large bivalves. The crests of these hills and ridges are generally crowned with a shallow bed of ferruginous sandstones, the fragments of which strew the flanks and feet of the elevations. Selenite occurs in great quantity and in large pieces, in the clay.

I think I have sent you pretty nearly all of any interest. I have written this letter in a great hurry, as I am just about starting for my trip across the steppe to Peroffsky, along the old course of the Djani Darya.

I look upon the canalisation of the Amú (somewhat in the way before suggested) as capital for the canalisation of Central Asia. It is a scheme which will certainly cost money, but the beneficial results will be so enormous to Russia herself, that I think it is all but certain to be entered on sooner or later. The climate is superb.

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* *Elæagnus* is cultivated, and the fruit is probably the *Ponticum* of Herodotus. Yule says Baker mentions incidentally the palm as growing on the banks of the Oxus. I have not Baker to refer to, but it would be interesting to know what word he uses; it is probable that he uses some word equivalent to *date*, and I cannot help thinking he means *Elæagnus*, the fruit of which is like a date. I have some fruit preserved in spirit—for Sir H. Rawlinson if he would like it. Curiously enough, the Russians call *Elæagnus*, *pheneke*, i.e. date, instead of its proper name, *Jidda*.

As to the name of the river Oxus, is it settled what was the meaning of this word? The legend on the map attached to the Grand Charter, compiled 1584–1598 A.D., translated by the Russian historian Karemzin, says: "And 170 versts (old versts of 700 sag.) from Bokhara, from Lake Oguz (which is *ox* in our language), flows a river towards Khoralim (Caspian)." Here Lake Victoria is Lake Oguz—*Lake of the Ox*. Yule, in his Oxus Essay, has a note, p. lxxxvi.: "It is worthy of notice that what has been regarded as a Yak, figured on the obelisk" (I suppose the one in the British Museum—the black obelisk) "of Nimroud is described in the accompanying inscription as Alap-Nahr-Sakiya, the ox of the river Sakiya, a title which may probably characterise the Upper Oxus, rising among the hills of the *Sakiya* or *Sacæ*." Did the name of the river come, then, from the Yak, which may have existed in Pamir, and is a sufficiently interesting animal to give its name to a stream it frequented? *Vide* note on p. lxiv. of Yule's Oxus Essay.

Cimbye, Mikus, and Petro Alexandroskiya are the three Russian posts or camps in the Amú Darya district.

MEMORIAL TO JEREMIAH HORROCKS

In reply to the petition recently published in NATURE, the Dean and Chapter of Westminster have signified their willingness to permit the erection of a tablet within the Abbey, and in consideration of the very exceptional circumstances of the case, have reduced the fee ordinarily payable to the Chapter to the sum of 25*l.*

A subscription, which it has been thought well to restrict to the sum of one guinea for each subscriber, has been set on foot to defray the expenses incidental to the erection of the tablet and the fee of the Chapter.

Should there be any surplus, it is proposed to invest it in the names of trustees, and to devote the interest to the purchase of books to be deposited in the library of the Royal Astronomical Society, the fund to be called "The Horrocks Library Fund."

Subscriptions have already been received from—

	£	s.	d.
J. Couch Adams, Esq., M.A., F.R.S., Lowndean Prof. of Astronomy in the University of Cambridge, President of the Royal Astronomical Society	1	1	0
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F. Styles, Esq.	1	1	0

General Treasurer—Prof. ADAMS, the Observatory, Cambridge.

The Rev. R. Brickel, the Rectory, Hoole, Preston, Lancashire; Prof. Grant, the Observatory, Glasgow; Mrs. G. M. Patmore, 81, Avenue Road, N.W.; and A. Cowper Ranyard, Esq., 25, Old Square, Lincoln's Inn, W.C., have kindly promised to receive and acknowledge subscriptions.

FERTILISATION OF FLOWERS BY INSECTS[*]

VII.

Butterflies the most frequent visitors of Alpine flowers.

IN the following article I wish to recommend for further inquiry a subject of peculiar interest which, in the environs of the Ortler, in Tyrol, forced itself on my attention last summer, but which, during my short stay in the Alps (8—25 July), I had not time to investigate so thoroughly as it deserves. Whilst occupied, along with my son, in observing the Alpine flowers and their fertilisation by insects, we were struck with the very small number of Apidæ met with in higher Alpine (subnival) localities, and with the predominant part which butterflies play in this region in relation to the fertilisation of flowers. In the environs of "Piz Umbrail" and "Quarta Cantoniera," 3,000—2,400 metres above the sea-level, we observed only four humble bees, and not a single individual of any other genus of Apidæ during a sojourn of five days, and in spite of very fine weather, whilst numerous Coleoptera (Dasytes, Anthobium, Anthophagus), many Diptera (especially Muscidæ and Syrphidæ), and very numerous specimens of some species of Lepidoptera were found in the flowers of this region.[†] Between 2,400 and 2,100 metres (descending towards Bormio and in the environs of Franzenshöh and Trafoi) the number and variety of Apidæ, other Hymenoptera, Coleoptera, and Diptera proved to be much greater; but, at the same time, the number and variety of Lepidoptera increased to such a degree that this order of insects was in unmistakable preponderance also in this region.[‡] In the plain, near Lippstadt, on the contrary, and in the lower mountainous region of Sauerland, Thuringia, and Fichtelgebirge, Diptera, but more especially Apidæ, are the most frequent visitors of flowers, although in the latter region a considerable increase in the proportion of Lepidoptera may be remarked.

Consulting our highest authority on the geographical distribution of butterflies in Germany and Switzerland, Dr. Speyer, of Rhoden, I heard that the fact alluded to would be in direct opposition to the general distribution of the species of Lepidoptera in altitude, the number continually decreasing from the lower mountainous to the higher Alpine (subnival) region; only the plain, as it seems, being somewhat poorer. This contradiction, however, may be, and, as I am convinced, from my observations, is, only an apparent one; for, notwithstanding the smaller number of species, the absolute frequency of Lepidopterous individuals, and perhaps also of species, is considerably greater in favourable Alpine localities than in equally large tracts of the lower mountains and of the plain, firstly in consequence of the smaller number of Alpine species distributed over a very restricted area; and secondly, because many of these species are represented in their restricted localities by a surprising number of individuals. Dr. Speyer himself writes me: "I have also myself been frequently struck with the great number, not only of individuals, but also of species, met with in favourable Alpine localities." Moreover, the relative frequency of butterflies, which alone is concerned in estimating their importance in the fertilisation of flowers, seems to be still greater than their absolute frequency in the higher Alpine (subnival) region; insects of other orders, with exception of the Diptera, apparently decreasing in a still larger ratio towards the snow-line. In order to appreciate adequately the differences of frequency alluded to and the share taken by butterflies in fertilising flowers in different regions, it would be necessary to ascertain the exact number of *individuals* of Lepidoptera and of other insects that visit certain flowers of the different regions in a given time. Unfortunately I have neglected such observations, and can only give some statistical data as to the number of *species* of Lepidoptera and other insects observed by myself to visit flowers in different regions. These data can afford but an approximate idea of the above differences, but they will, I hope, sufficiently show that these differences are by no means a product of my imagination, but a matter of fact, and that in Alpine regions Lepidoptera are really of considerably greater importance in relation to the fertilisation of flowers than in the plains.

There are some few species of flowers which I have had the opportunity of observing as to their visitors both in the plain or in the lower mountainous and in the Alpine region; these, of course, will be the most useful for comparison. For the sake of a more easy survey of the statistical notes I shall make use of the following abbreviations: *a* = in the plain, near Lippstadt; *b* = in the lower mountainous region of Sauerland, Thuringia, Fichtelgebirge; *c* = in the Alpine region, near Trafoi, Franzenshöh, Quarta Cantoniera; *Ap.* = Apidæ; *Lep.* = Lepidoptera; *O.I.* = other insects.

The following is a list of the visitors to different plants, so far as I have observed.

1. *Helianthemum vulgare*:—

b. Ap. 5, Lep. 1, O.I. 16 species; Ap. 23, Lep.[*] 5, O.I. 72 per cent.
c.[†] ,, 1, ,, 7, ,, 3 ,, ,, 9, ,, 64, ,, 27 ,,

2. *Lotus corniculatus*:—

a. Ap. 19, Lep. 5, O.I. 2 species; Ap. 73, Lep. 19, O.I. 8 per cent.
b. ,, 17, ,, 7, ,, 2 ,, ,, 65, ,, 27, ,, 8 ,,
c. ,, 2, ,, 4, ,, 0 ,, ,, 33, ,, 66, ,, 0 ,,

3. *Prunella vulgaris*:—

a. Ap. 8, Lep. 4, O.I. 0 species; Ap. 66, Lep. 33, O.I. 0 per cent.
b. ,, 4, ,, 2, ,, 0 ,, ,, 66, ,, 33, ,, 0 ,,
c. ,, 1, ,, 4, ,, 1 ,, ,, 17, ,, 67, ,, 17 ,,

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[*] Continued from vol. x. p. 130.

[†] Rhopalocera: *Pieris callidice* Esp., *Lycaena orbitulus* Prunn., *L. semiargus* Rott., *Melitæa merope* Prunn., *M. parthenie* Bkh. var. varia. M.D., *Argynnis pales* W.V., *Erebia tyndarus* Esp. Geometræ: *Psodos alpinata* Scop., *Pygmæna fusca* Thbg. Crambina: *Hercyna schrankiana* Hoch. (*Holosericalis* H.), *H. phrygialis* H., *H. rupestralis* H., *Crambus luctiferellus* H.—according to Dr. Speyer's determination.

[‡] We found here Rhopalocera 33, Sphingidæ 4, Bombyces 5, Noctuæ 3, Geometræ 3, Crambina 6, Tineina 2, Pterophorina 1, altogether 57 species of Lepidoptera visiting flowers.

[*] It should be noticed that as the flowers of *Helianthemum vulgare* do not secrete honey, Lepidoptera must either obtain a little of the juices of the flowers by boring, or are altogether deceived.

[†] In the Alpine region my observations have been made on the *var.* grandiflorum.

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